16-Port 10/100Mbps PoE Fast Ethernet Switch

FNSW-1600P

User's Manual

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Energy Saving Note of the Device

This power required device does not support Standby mode operation.

For energy saving, please remove the power cable to disconnect the device from the power circuit.

Without removing power cable, the device will still consuming power from the power source. In the view of Saving the Energy and reduce the unnecessary power consuming, it is strongly suggested to remove the power connection for the device if this device is not intended to be active.

WEEE Warning

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

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1. Introduction

1.1 Checklist

Check the contents of your package for following parts:

- FNSW-1600P x 1
- User's Manual x 1
- Power Cord x 1
- Rubber Feet x 4
- Two Rack-mounting Brackets with Attachment Screws x 8

If any of these pieces are missing or damaged, please contact your dealer immediately, if possible, retain the carton including the original packing material, and use them against to repack the product in case there is a need to return it to us for repair.

In the following section, the term **"PoE Fast Ethernet Switch"** means the Switch device, ie. FNSW-1600P; term of **"switch"** can be any third switches.

1.2 Product Description

Centralized Power Distribution for Ethernet Networking

To fulfill the demand of sufficient PoE power for network applications with Gigabit speed transmission, PLANET introduces a new member in the 802.3af PoE Fast Ethernet Switch family – **FNSW-1600P**, the **16-Port 10/100Mbps 802.3af Power over Ethernet Switch** with **125 Watts** PoE budget. The 16 x 802.3af PoE ports provide PoE power injector function which is able to drive at least 9 x IEEE 802.3af 12.95 Watts Class 3 compliant powered devices. The **FNSW-1600P** also provides a simple, cost-effective, and non-blocking wire-speed performance with 19-inch metal shape for deployment in compact housing, SOHO office or department network application.

Great Ethernet Traffic Transmission Ability

The FNSW-1600P features high performance switch architecture capable of providing the non-blocking 3.2Gbps switch fabric and wire-speed throughput as high as 2.38Mpps, which greatly simplifies the tasks of upgrading the LAN for catering to increasing bandwidth demands. Besides, the 802.3x Full-Duplex flow control function of the FNSW-1600P enables PD devices and servers directly connect to the Switch for wire-speed packet transfer performance without risk of packet loss.

Easy Cable Connection

With data and power over Ethernet from one unit, the FNSW-1600P shall reduce cables and eliminates the need for dedicated electrical outlets on the wall, ceiling or any unreachable place. A wire carries both data and power lowering the installation costs, simplifying the installation effort and eliminating the need for electricians or extension cords. With 125Watts Power Budget, the FNSW-1600P is ideal for small business and workgroups requiring to deploy the PoE for the wireless access points, IP-based surveillance camera or IP phones in any places easily, efficiently and cost effective.

1.3 Features

- RJ-45 Interface
  - ❒ 16-Port 10/100Mbps Fast Ethernet ports
  - ❒ Each Ethernet port supports 48V DC power to PoE Powered Device
- Power over Ethernet
  - ❒ Comply with IEEE 802.3af Power over Ethernet Mid-Span PSE
  - ❒ Up to 16 IEEE 802.3af devices powered
  - ❒ PoE Power Budget 125 Watts
  - ❒ Supports PoE Power up to 15.4 Watts for each PoE port
  - ❒ Auto detect powered device (PD)
  - ❒ Circuit protection prevents power interference between ports
  - ❒ Remote power feeding up to 100m
- Switching
  - ❒ Hardware based 10/100Mbps Auto-Negotiation and Auto MDI/MDI-X
  - ❒ Flow control for Full Duplex operation and back pressure for Half Duplex operation
  - ❒ Integrates address look-up engine, supporting 8K absolute MAC addresses
  - ❒ Automatic address learning and address aging
- Hardware
  - ❒ 19-inch size, 1U height
  - ❒ LED indicators for PoE ready and PoE activity
  - ❒ 2 silent FAN to provide stable and efficient power performance

1.4 Specification

Model	**FNSW-1600P** 16-Port 10/100Mbps PoE Fast Ethernet Switch
Hardware Specification	
Network Connector	16-Port RJ-45 for 10/100Base-TX
PoE Inject Port	16-Port with 802.3af PoE injector function
LED Display	System: Power (Green) Per port: PoE (Orange) LNK/ACT (Green)
Switch Architecture	Store and Forward switch architecture
MAC Address	8K MAC address table with Auto learning function
Switch Fabric	3.2Gbps
Switch Throughput	2.38Mpps@64Bytes
Power Requirement	AC 100~240V, 50/60Hz, 2A max.
Power Consumption	Max.135 Watts / 460 BTU
Dimension (W x D x H)	445 x 207 x 45 mm (1U height)
Weight	2.33kg
Power over Ethernet	
PoE Standard	IEEE 802.3af Power over Ethernet / PSE
PoE Power Supply Type	Mid-Span
PoE Power Output	Per Port 48V DC, 350mA. Max. 15.4 Watts
Power Pin Assignment	4/5(-), 7/8(+)
PoE Power Budget	125 Watts
Standard Conformance	
EMI Safety	FCC Class A, CE
Standard Compliance	IEEE 802.3 Ethernet IEEE 802.3u Fast Ethernet IEEE 802.3x Flow Control IEEE 802.3af Power over Ethernet
Environment	
Operating environment	0 ~ 50 Degree C
Storage environment	-40 ~ 70 Degree C
Operating Humidity	5 ~ 95%, relative humidity, non-condensing
Storage Humidity	5 ~ 95%, relative humidity, non-condensing

2. Hardware Description

This product provides two different running speeds – 10Mbps and 100Mbps in the same switch and automatically distinguishes the speed of incoming connection.

This section describes the hardware features of FNSW-1600P. For easier management and control of the Switch, familiarize yourself with its display indicators, and ports. Front panel illustrations in this chapter display the unit LED indicators. Before connecting any network device to the FNSW-1600P, please read this chapter carefully.

2.1 Front Panel

The Front Panel of the FNSW-1600P PoE Fast Ethernet Switch consists of 16 x Auto-Sensing 10/100Mbps Ethernet RJ-45 Ports. The LED Indicators are also located on the front panel of the FNSW-1600P.

Figure 2-1: FNSW-1600P Switch Front Panel

2.1.1 LED Indicators

System

LED	Color	Function
PWR	Green	**Light:** Indicate the Switch has power.

Per 10/100Mbps Port

LED	Color	Function
PoE In Use	Orange	**Light:** Indicate the port is providing 48V DC in-line power.
LNK/ACT	Green	**Light:** Indicate the link through that port is successfully established. **Blink:** Indicate that the Switch is actively sending or receiving data over that port.

2.2 Rear Panel

The rear panel of the FNSW-1600P PoE Fast Ethernet Switch indicates an AC inlet power socket, which accepts input power from 100 to 240V AC, 50-60Hz, 2A.

Figure 2-2: FNSW-1600P Switch Rear Panel

Power Notice

The device is a power-required device, it means, it will not work till it is powered. If your networks should active all the time, please consider using UPS (Uninterrupted Power Supply) for your device. It will prevent you from network data loss or network downtime.
In some area, installing a surge suppression device may also help to protect your FNSW-1600P from being damaged by unregulated surge or current to the FNSW-1600P or the power adapter.

3. Hardware Installation

Start up

Please refer to the followings for your cabling:

10/100Base-TX

All 10/100Base-TX ports come with Auto-Negotiation capability. They automatically support 100Base-TX and 10Base-T networks. Users only need to plug a working network device into one of the 10/100Base-TX ports, and then turn on the FNSW-1600P. The port will automatically runs in 10Mbps, 20Mbps, 100Mbps or 200Mbps after the negotiation with the connected device.

Cabling

Each 10/100Base-TX ports use RJ-45 sockets -- similar to phone jacks -- for connection of unshielded twisted-pair cable (UTP). The IEEE 802.3 / 802.3u Fast Ethernet standard requires Category 5, 5e UTP for 100Mbps 100Base-TX. 10Base-T networks can use Cat. 3, 4, 5 (see table below). Maximum distance is 100meters (328 feet).

Port Type	Cable Type	Connector
10Base-T	Cat. 3, 4, 5, 2-pair	RJ-45
100Base-TX	Cat. 5, 5e UTP, 2-pair	RJ-45

Any Ethernet devices like hubs / PCs can connect to the FNSW-1600P by using straight-through wires. The 16-10/100Mbps ports are auto-MDI/MDI-X can be used on straight-through or crossover cable.

3.1 Desktop Installation

To install the PoE Fast Ethernet Switch on desktop, simply follow the next steps:

Step 1: Attach the rubber feet to the recessed areas on the bottom of the PoE Fast Ethernet Switch, as shown in Figure 3-1.

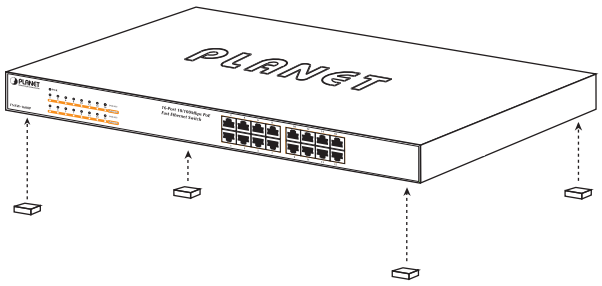


Figure 3-1: Attaching the Rubber Feet to the PoE Fast Ethernet Switch

Step 2: Place the PoE Fast Ethernet Switch on desktop near an AC power source.

Step 3: Keep enough ventilation space between the PoE Fast Ethernet Switch and the surrounding objects.

Note

When choosing a location, please keep in mind the environmental restrictions discussed in Chapter 1, Section 4, in Specification.

Step 4: Connect your PoE Fast Ethernet Switch to 802.3af complied Power Devices (PD) and other network devices.

A. Connect one end of a standard network cable to the 10/100 RJ-45 ports at front panel of the PoE Fast Ethernet Switch.

B. Connect the other end of the cable to the network devices such as printer servers, workstations or routers…etc.

Note

Connection to the Switch requires UTP Category 5, 5e, 6 network cabling with RJ-45 tips. For more information, please see the Cabling Specification in Appendix A.

Step 5: Supply power to the PoE Fast Ethernet Switch.

A. Connect one end of the power cable to the PoE Fast Ethernet Switch.

B. Connect the power plug of the power cable to a standard wall outlet.

When the PoE Fast Ethernet Switch receives power, the Power LED should remain solid Green.

3.2 Rack Mounting

To install the PoE Fast Ethernet Switch in a 19-inch standard rack, follow the instructions described below.

Step 1: Place your PoE Fast Ethernet Switch on a hard flat surface, with the front panel positioned towards your front side.

Step 2: Attach a rack-mount bracket to each side of the PoE Fast Ethernet Switch with supplied screws attached to the package. Figure 3-2 shows how to attach brackets to one side of the PoE Fast Ethernet Switch.

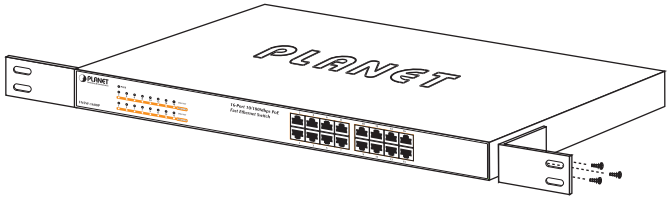


Figure 3-2: Attaching the Brackets to the PoE Fast Ethernet Switch

You must use the screws supplied with the mounting brackets. Damage caused to the parts by using incorrect screws would invalidate the warranty.

Step 3: Secure the brackets tightly.

Step 4: Follow the same steps to attach the second bracket to the opposite side.

Step 5: After the brackets are attached to the Switch, use suitable screws to securely attach the brackets to the rack, as shown in Figure 3-3.

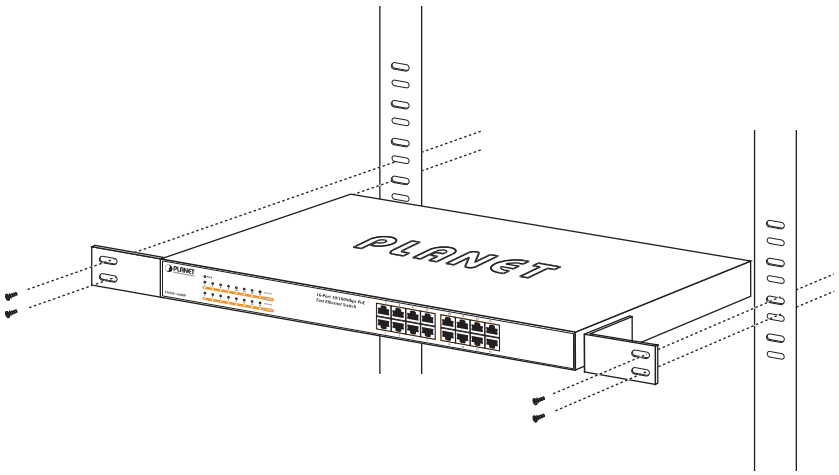


Figure 3-3: Mounting the PoE Fast Ethernet Switch in a Rack

Step 6: Proceeds with the steps 4 and steps 5 of **session 3.1 Desktop Installation** to connect the network cabling and supply power to your Switch.

3.3 Product Application

Department/ Workgroup PoE Switch:

Providing 16-Port PoE in-line power interfaces, the FNSW-1600P can easily build a power centrally-controlled IP phone system, IP Camera system and Wireless AP group for the enterprise. Cameras can be installed around the corner in the company or campus for surveillance demands or Wireless AP to build a wireless roaming environment in the office. Without the power-socket limitation, the Switch makes the installation of cameras or Wireless AP more easily and efficiently.

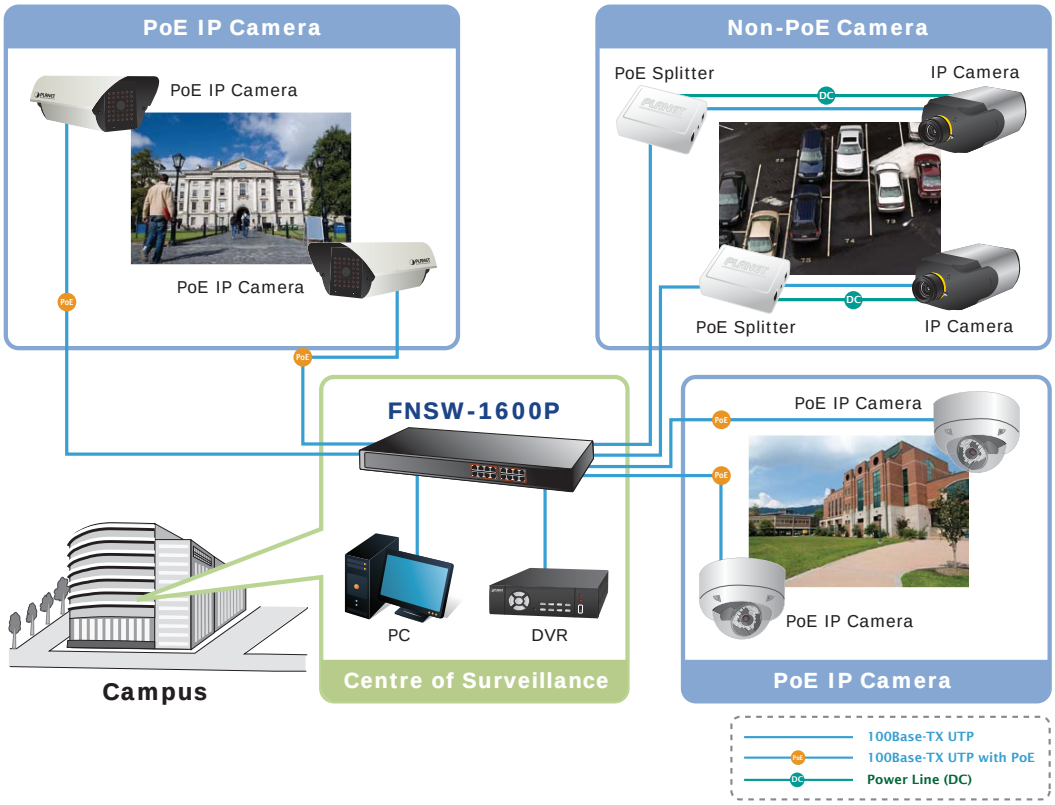


Figure 3-4: Department / Workgroup PoE Switch Connection

3.4 Power over Ethernet Powered Device

3~5 Watts	**Voice over IP phones** Enterprise can install POE VoIP Phone, ATA and other Ethernet/ non-Ethernet end-devices to the central where UPS is installed for un-interrupt power system and power control system.
6~12 Watts	**Wireless LAN Access Points** Museum, Sightseeing, Airport, Hotel, Campus, Factory, Ware-house can install the Access Point any where with no hesita-tion.
10~12 Watts	**IP Surveillance** Enterprise, Museum, Campus, Hospital, Bank, can install IP Camera without limits of install location – no need electrician to install AC sockets.
3~12 Watts	**PoE Splitter** PoE Splitter split the PoE 48V DC over the Ethernet cable into 5/12V DC power output. It frees the device deployment from restrictions due to power outlet locations, which eliminate the costs for additional AC wiring and reduces the installation time.

4. Power over Ethernet Overview

What is PoE?

Based on the global standard IEEE 802.3af, PoE is a technology for wired Ethernet, the most widely installed local area network technology adopted today. PoE allows the electrical power necessary for the operation of each end-device to be carried by data cables rather than by separate power cords. New network applications, such as IP Cameras, VoIP Phones, and Wireless Networking, can help enterprises improve productivity. It minimizes wires that must be used to install the network for offering lower cost, and less power failures.

IEEE 802.3af also called Data Terminal equipment (DTE) power via Media dependent interface (MDI) is an international standard to define the transmission for power over Ethernet. The 802.3af is delivering 48V power over RJ-45 wiring. Besides 802.3af also define two types of source equipment: Mid-Span and End-Span.

■ Mid-Span

Mid-Span device is placed between legacy switch and the powered device. Mid-Span is tap the unused wire pairs 4/5 and 7/8 to carry power, the other four is for data transmit.

■ End-Span

End-Span device is direct connecting with power device. End-Span could also tap the wire 1/2 and 3/6.

PoE System Architecture

The specification of PoE typically requires two devices: the **Powered Source Equipment (PSE)** and the **Powered Device (PD)**. The PSE is either an End-Span or a Mid-Span, while the PD is a PoE-enabled terminal, such as IP Phones, Wireless LAN, etc. Power can be delivered over data pairs or spare pairs of standard CAT-5 cabling.

How is Power Transferred Through the Cable

A standard CAT5 Ethernet cable has four twisted pairs, but only two of these are used for 10BASE-T and 100BASE-T. The specification allows two options for using these cables for power, shown in Figure 2 and Figure 3:

The spare pairs are used. Figure 2 shows the pair on pins 4 and 5 connected together and forming the positive / negative supply, and the pair on pins 7 and 8 connected and forming the positive / negative supply. (In fact, a late change to the spec allows either polarity to be used).

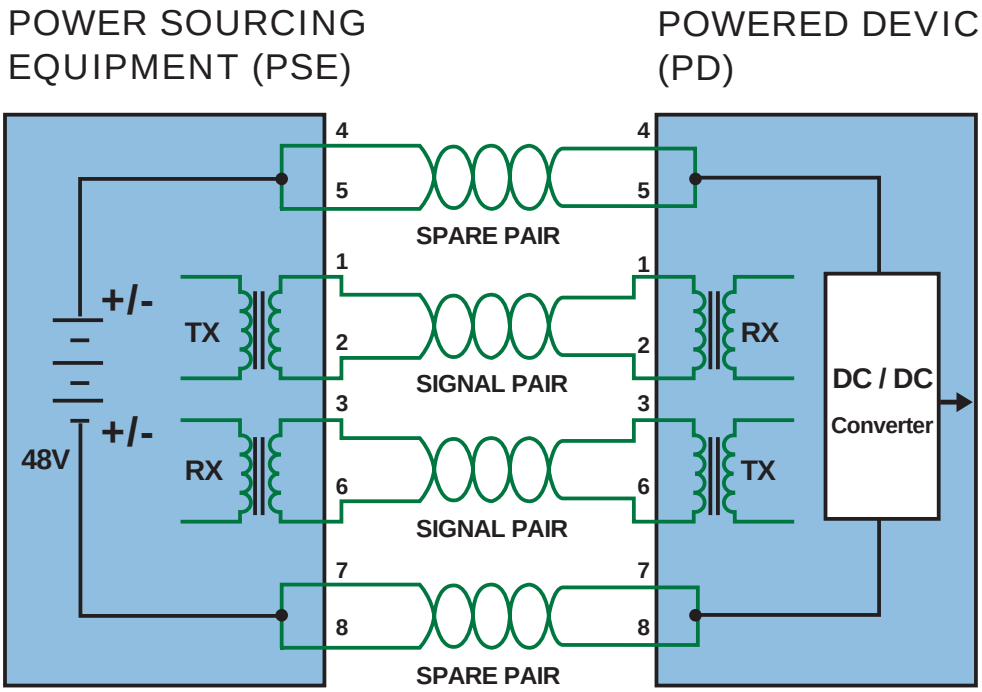


Figure 1 - Power Supplied over the Spare Pins

The data pairs are used. Since Ethernet pairs are transformer coupled at each end, it is possible to apply DC power to the center tap of the isolation transformer without upsetting the data transfer. In this mode of operation the pair on pins 3 and 6 and the pair on pins 1 and 2 can be of either polarity.

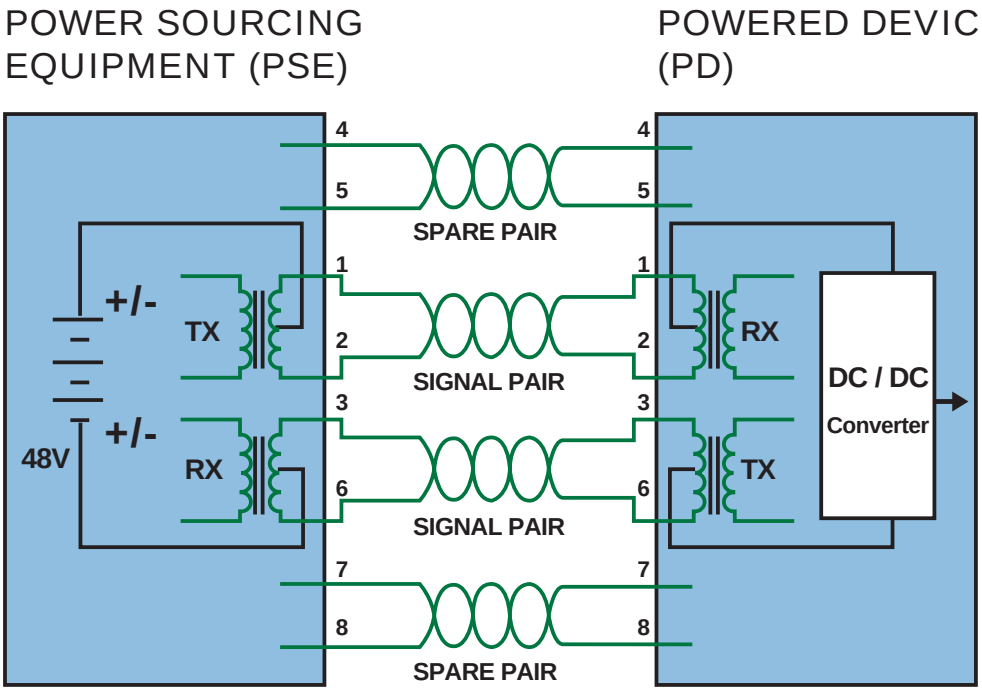


Figure 2 - Power Supplied over the Data Pins

When to install PoE?

Consider the following scenarios:

- You're planning to install the latest VoIP Phone system to minimize cabling building costs when your company moves into new offices next month.
- The company staff has been clamoring for a wireless access point in the picnic area behind the building so they can work on their laptops through lunch, but the cost of electrical power to the outside is not affordable.
- Management asks for IP Surveillance Cameras and business access systems throughout the facility, but they would rather avoid another electrician's payment.

References:

IEEE Std 802.3af-2003 (Amendment to IEEE Std 802.3-2002, including IEEE Std 802.3ae-2002), 2003 Page(s):0_1-121

White Paper on Power over Ethernet (IEEE 802.3af)
http://www.poweroverethernet.com/articles.php?article_id=52

Microsemi / PowerDsine
http://www.microsemi.com/PowerDsine/

Linear Tech
http://www.linear.com/

5. Troubleshooting

This chapter contains information to help you solve issues. If the PoE Fast Ethernet Switch is not functioning properly, make sure the PoE Fast Ethernet Switch was set up according to instructions in this manual.

The Link LED is not light

Solution:

Check the cable connection and remove duplex mode of the PoE Fast Ethernet Switch.

Performance is bad

Solution:

Check the full duplex status of the Switch. If the PoE Fast Ethernet Switch is set to full duplex and the partner is set to half duplex, then the performance will be poor.

100Base-TX port link LED is light, but the traffic is irregular

Solution:

Check that the attached device is not set to dedicate full duplex. Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.

Why the Switch doesn't connect to the network

Solution:

Check the LNK/ACT LED on the switch Try another port on the PoE Fast Ethernet Switch Make sure the cable is installed properly Make sure the cable is the right type Turn off the power. After a while, turn on power again.

Why connects PoE device to FNSW-1600P and it cannot power on?

Solution:

Please check the cable type of the connection from FNSW-1600P to the other end. The cable should be an 8-wire UTP, Category 5 or above, EIA568 cable within 100 meters. A cable with only 4-wire, short loop or over 100 meters, all will affect the power supply.

Please check and assure the device that fully complied with IEEE 802.3af standard.

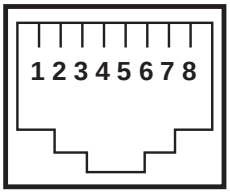
What is the power output of each IEEE 802.af PoE port?

Solution:

Each PoE port supports **48V DC, 350mA, max 15.4 Watts** power output. Detect and inject by the standard of IEEE 802.3af.

Appendix A Networking Connection

A.1 DATA OUT PoE Switch RJ-45 Port Pin Assignments



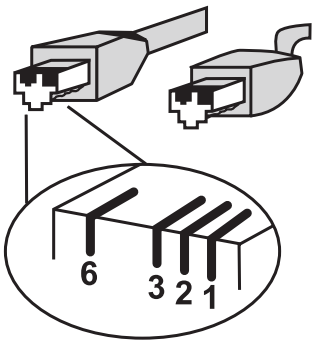
PIN NO	RJ-45 SIGNAL ASSIGNMENT
1	● Output Transmit Data +
2	● Output Transmit Data –
3	● Receive Data +
4	● Negative Power –
5	● Negative Power –
6	● Receive Data –
7	● Positive Power +
8	● Positive Power +

A.2 10/100Mbps, 10/100Base-TX

When connecting Switch to another Fast Ethernet switch, a straight or crossover cable might necessary. Each port of the Switch supports auto-MDI/MDI-X detection. That means you can directly connect the Switch to any Ethernet devices without making a crossover cable. The following table and diagram show the standard RJ-45 receptacle/ connector and their pin assignments:

RJ-45 Connector pin assignment		
Contact	MDI Media Dependant Interface	MDI-X Media Dependant Interface-Cross
1	Tx + (transmit)	Rx + (receive)
2	Tx - (transmit)	Rx - (receive)
3	Rx + (receive)	Tx + (transmit)
4, 5	Not used	
6	Rx - (receive)	Tx - (transmit)
7, 8	Not used	

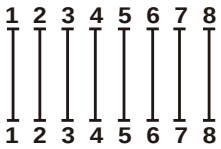
The standard cable, RJ-45 pin assignment



The standard RJ-45 receptacle/connector

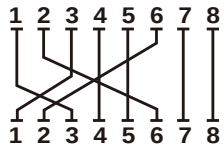
There are 8 wires on a standard UTP/STP cable and each wire is color-coded. The following shows the pin allocation and color of straight cable and crossover cable connection:

Straight Cable



	SIDE 1	SIDE 2
SIDE 1	1 = White/Orange	1 = White/Orange
	2 = Orange	2 = Orange
	3 = White/Green	3 = White/Green
	4 = Blue	4 = Blue
	5 = White/Blue	5 = White/Blue
SIDE 2	6 = Green	6 = Green
	7 = White/Brown	7 = White/Brown
	8 = Brown	8 = Brown

Crossover Cable



	SIDE 1	SIDE 2
SIDE 1	1 = White/Orange	1 = White/Green
	2 = Orange	2 = Green
	3 = White/Green	3 = White/Orange
	4 = Blue	4 = Blue
	5 = White/Blue	5 = White/Blue
SIDE 2	6 = Green	6 = Orange
	7 = White/Brown	7 = White/Brown
	8 = Brown	8 = Brown

Figure A-1: Straight-Through and Crossover Cable

Please make sure your connected cables are with same pin assignment and color as above picture before deploying the cables into your network.

EC Declaration of Conformity

For the following equipment:

*Type of Product: FNSW-1600P
*Model Number: 16-Port 10/100Base-TX PoE Fast Ethernet Switch

* Produced by:
Manufacturer‘s Name : **Planet Technology Corp.**
Manufacturer‘s Address: 10F., No.96, Minquan Rd., Xindian Dist.,
New Taipei City 231, Taiwan (R.O.C.).

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility Directive on (2004/108/EC).
For the evaluation regarding the EMC, the following standards were applied:

EN 55022	(2006+A1:2007, Class A)
EN 61000-3-2	(2006+A2:2009)
EN 61000-3-3	(2008)
EN 55024	(1998 + A1: 2001 + A2: 2003)
IEC 61000-4-2	(2008)
IEC 61000-4-3	(2006 + A1:2007 + A2:2010)
IEC 61000-4-4	(2004 + A1:2010)
IEC 61000-4-5	(2005)
IEC 61000-4-6	(2008)
IEC 61000-4-8	(2009)
IEC 61000-4-11	(2004)

Responsible for marking this declaration if the:

☒ **Manufacturer** ☐ **Authorized representative established within the EU**

Authorized representative established within the EU (if applicable):

Company Name: **Planet Technology Corp.**

Company Address: **10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)**

Person responsible for making this declaration

Name, Surname **Kent Kang**

Position / Title : **Product Manager**

Taiwan	**24st Oct., 2011**	Kent Kang
Place	*Date*	*Legal Signature*

PLANET TECHNOLOGY CORPORATION

e-mail: sales@planet.com.tw http://www.planet.com.tw
10F., No.96, Minquan Rd., Xindian Dist., New Taipei City, Taiwan, R.O.C. Tel:886-2-2219-9518 Fax:886-2-2219-9528